

Dr Alison C McCarthy
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Esteem factors

- \$2.0 million in successful research grants since 2010
- Co-recipient of 2018 Cotton Seed Distributors Researcher of the Year
- Received 2015 Young Tall Poppy Award - Queensland
- Received 2014 Science and Innovation Award for Young People in Agriculture, Fisheries and Forestry - Minister's Award and Cotton Award
- Invited speaker for Hort Connections 2017, Pioneer Hi-Bred Australia Conference 2017, Digital Rural Futures Conference 2014 and Innovation Generation 2014
- Received NPSI/IAL Travel Fellowship Award in 2010/11
- Awarded University Medal in 2007 from University of Southern Queensland

Qualifications

- 2010 Doctor of Philosophy, University of Southern Queensland
- 2007 Bachelor of Engineering (First Class Honours) majoring in Mechatronics, University of Southern Queensland (Grade point average of 6.91)

Professional affiliations

- Association of Australian Cotton Scientists – Full Member since 2013

Areas of expertise

- Camera-based monitoring of cotton, grain, sugarcane, pasture and vegetable crops
- Management of in-field spatial and temporal variability using site-specific irrigation

Employment history

January 2014 to date, Research Fellow (Irrigation)

National Centre for Engineering in Agriculture, University of Southern Queensland

July 2010 to January 2014, Postdoctoral Research Fellow (Irrigation)

National Centre for Engineering in Agriculture, University of Southern Queensland

September 2013 and 2014, LaTeX Workshop instructor for ENG3902 Professional Practice 1

Faculty of Faculty of Health, Engineering and Sciences, University of Southern Queensland

July 2010, LaTeX Workshop instructor for postgraduate students

Faculty of Faculty of Health, Engineering and Sciences, University of Southern Queensland

March 2010 to May 2010, Part-time mechatronic research engineer

National Centre for Engineering in Agriculture, University of Southern Queensland.

Successful research grants

Project title	Funding body	Chief investigator/s
'Identifying sensors for better IPM in cotton' July 2018-June 2021 \$420 000	Cotton Research and Development Corporation	Dr Alison McCarthy, Derek Long, Ralph Shippam (NCEA), Dr Paul Grundy from DAF
'Evaluation of camera variety trial sensing in the USA' August 2017-December 2018 \$100 000	Monsanto	Dr Alison McCarthy, Roy Anderson (IAgE), Ralph Shippam (NCEA)
'Automated camera-based monitoring and detection of corn and soybean flowering and growth' September 2016-June 2017	Monsanto	Dr Alison McCarthy, Bo Zhao (IAgE)

\$132 529		
'Sensor smart irrigation' July 2015-January 2017 \$27 670 (project total \$500 000)	SenseT	Dr Marcus Hardie from University of Tasmania, Dr Alison McCarthy, Lidya Agustina from NCEA
'Improving horticulture irrigation and fertiliser application using real-time adaptive control' July 2014-June 2017 \$180 000 (with matched sponsor funding from USQ)	Queensland Government DSITIA Early Career Accelerate Fellowship	Dr Alison McCarthy
'Development of integrated plant-based image sensing system for soil-water and nitrogen status estimation in cotton' July 2014-June 2015 \$19 000	2014 Science and Innovation Award for Young People in Agriculture, Fisheries and Forestry - Minister's Award	Dr Alison McCarthy
'Development of a plant-based image sensing system for soil-water estimation' July 2014-June 2015 \$22 000	2014 Science and Innovation Award for Young People in Agriculture, Fisheries and Forestry -Cotton Award	Dr Alison McCarthy
'Advancing VARIwise with autonomous irrigation and a grower's guide' July 2013-June 2016 \$509 951	Cotton Research and Development Corporation	Dr Alison McCarthy, Dr Diogenes Antille, Ms Lidya Agustina
'Remote monitoring and automatic detection of grain crop attributes' July 2013-December 2014 \$149 990	Grain Research and Development Corporation	Dr Alison McCarthy, Dr Matthew Tschärke
'Optimal irrigation of cotton via real-time adaptive control' July 2010-June 2013 \$314 797	Cotton Research and Development Corporation	Dr Alison McCarthy
'Site-specific irrigation control and sensing systems' March 2011 \$10 000	Irrigation Australia Limited (IAL) and National Program for Sustainable Irrigation (NPSI) Travel Fellowship Award 2010	Dr Alison McCarthy

Professional service

- Part of organising committee for Cotton Research Conference 2015
- Reviewer for journals *Transactions of the ASABE*, *Irrigation Science*, *Computers and Electronics in Agriculture* and *Environment, Development and Sustainability*
- Member of Scientific Committee for *Australian Society for Engineering in Agriculture Conference* as reviewer

Awards

- University Medal (2007), University of Southern Queensland
- Zonta Advancement Award (2005), University of Southern Queensland
- Engineering and Surveying Faculty Undergraduate Scholarship (2003), University of Southern Queensland

Research supervision

- Co-supervisor of PhD student Vishal Rana 'A self-learning irrigation scheduling unit: giving intelligence to the automated furrow irrigation system'
- Five Bachelor of Engineering Honours students in 2012-2018

Publications

Journal articles:

MCCARTHY AC, Hancock NH and Raine SR (2014a), Development and simulation of sensor-based irrigation control strategies for cotton using the VARIwise simulation framework, *Computers and Electronics in Agriculture*, Volume 101, February 2014, Pages 148-162.

[impact factor = 1.486, cited by 3]

MCCARTHY AC, Hancock NH and Raine SR (2014b), Simulation of irrigation control strategies for cotton using Model Predictive Control within the VARIwise simulation framework, *Computers and Electronics in Agriculture*, Volume 101, February 2014, Pages 135-147.

[impact factor = 1.486, cited by 3]

Thorp, KR, Ale, S, Bange, MP, Barnes, EM, Hoogenboom, G, Lascano, RJ, MCCARTHY, AC, Nair, S, Paz, JO, Rajan, N, Reddy, KR, Wall, GW, White, JW (2014) Development and application of process-based simulation models for cotton production: a review of past, present, and future directions. *Journal of Cotton Science* **18**(1):10-47. ISSN 1523-6919 [cited by 7]

MCCARTHY, AC, Hancock, NH and Raine, SR (2013) Advanced process control of irrigation: the current state and an analysis to aid future development. *Irrigation Science* **31**(3):183-192.

[impact factor = 2.84, cited by 9]

MCCARTHY, AC, Hancock, NH and Raine, SR (2011) Real-time data requirements for model-based adaptive control of irrigation scheduling in cotton. *Australian Journal of Multi-disciplinary Engineering* **8**(2):189-206.

MCCARTHY, AC, Hancock, NH and Raine, SR (2010a) VARIwise: a general-purpose adaptive control simulation framework for spatially and temporally varied irrigation at sub-field scale. *Computers and Electronics in Agriculture* **70**(1):117-128.

Smith, RJ, Raine, S.R., MCCARTHY, A.C. and Hancock, NH (2009) Managing spatial and temporal variability in irrigated agriculture through adaptive control. *Australian Journal of Multi-disciplinary Engineering* **7**(1):79-90.

Refereed conference papers:

MCCARTHY, A, Hedley, C and El-Naggar, A (2017) Machine vision for camera-based horticulture crop growth monitoring. *In: PA17 - The International Tri-Conference for Precision Agriculture in 2017 7th ACPA - Asian-Australasian Conference on Precision Agriculture*, 16-18 October 2017, Hamilton, New Zealand.

MCCARTHY, A, El-Naggar, A, Roudier, P and Hedley, C (2017) Site-specific irrigation using automated control and machine vision for horticulture crops in Queensland and New Zealand. *In: 18th Australian Agronomy Conference 2017*, 24-28 Sept 2017, Ballarat, Victoria.

MCCARTHY, AC, Nguyen-Ky, T, and Raine, SR (2015) Data requirements for automated model-based control of irrigation and fertiliser application. *In: 17th Australian Agronomy Conference*, 24-24 September, Hobart.

MCCARTHY, AC, Hancock, NH and Raine, SR (2010b) Holistic control system design for large mobile irrigation machines. *In: 16th Annual Conference on Mechatronics and Machine Vision in Practice*, 22-24 June, Brunei.

Most notable conference papers:

MCCARTHY, AC, Nguyen-Ky, T and Raine, SR (2015), Image analysis and artificial intelligence based approach for soil-water and nitrogen status estimation. *In: Australia Cotton Research Conference*, 8-10 September, Toowoomba.

MCCARTHY, AC and Hancock, NH (2013), Development of a sensing system for automated cotton fruit load and vegetation estimation. *In: Australia Cotton Research Conference*, 8-11 September, Narrabri.

MCCARTHY, AC, Gillies, MH and Smith, RJ (2013), Real-time, web-enabled adaptive control and monitoring of surface and overhead irrigation systems. *In: Digital Rural Futures Conference*, 26-28 June, Armidale.

Engagement activities

Industry groups:

I have presented to cotton and grain growers at the following industry field days:

- 15 cotton growers in Emerald, 120 growers in Moree and 45 growers in Warren for the Irrigation Technologies Research Tour
- 100 grain growers for the Pacific Seeds Wheat and Barley Field Day
- 100 conference participants and local industry representative at the field days for the Digital Rural Futures Conference in 2013 and 2014 and
- 20 members of the Mackillop Farm Management Group
- 80 dairy researchers and producers at TIA Dairy Centre Open Day

Industry events:

- I have presented at 30 grain, cotton and irrigation conferences and workshops since 2012 (e.g. Australian Cotton Conference, Cotton Research Conference, Irrigation Australia Conference, Innovation Generation, Australian Agronomy Conference)

Industry magazines:

- Five articles in the cotton research magazine Spotlight
- Six articles in the Australian Cottongrower Magazine
- Two articles in the Irrigation Australia Journal
- One article in the grain research magazine Ground Cover
- Two articles in the Society of Precision Agriculture (SPAA) magazine

Mainstream newspaper articles:

- Four articles on my research in the Toowoomba newspaper 'The Chronicle'
- Article in the Burnie newspaper 'The Advocate' on dairy irrigation research

Radio interviews:

- One ABC Rural radio interview on my Science Awards

Television interviews:

- Regional WIN News story on my irrigation research

Politicians and political advisors:

- I have given demonstrations to state and federal policy makers: Dr Geoff Garrett (Queensland Chief Scientist); Hon Ian Walker (State Minister for Science, Information Technology, Innovation and the Arts); Queensland Ministry Chief of staff for innovation portfolio; Senator Glenn Lazarus; Mr Greg Gilbert (Advisor (Science) to Hon Ian MacFarlane MP); and Members of the Queensland Department for Agriculture and Fisheries Board of Management
- I have participated in state political events: Hon Ian Walker's launch of the Science and Innovation Action Plan launch; meeting of International Chief Scientists as part of the lead up to the G20; Innovation Series 2014 on Agriculture, Robotics and Collaboration; 2014 Science in Parliament Science Celebration, also attended by the Queensland Government Minister for Science, Information Technology, Innovation and the Arts Ian Walker and Queensland Chief Scientist Geoff

School students and teachers:

I have given demonstrations of my research to the following school students and teachers:

- 500 Harristown State High School students as part of Level Gold and Silver Award Ceremony
- 100 Toowoomba Downlands Year 12 students
- 10 high school students as part of the USQ Equity Project
- 30 primary school students at Toowoomba Heritage Bank Ag Show
- 40 Year 10-12 school students from Toowoomba schools as part of the Gateway Schools to Agriculture Farmstay Camp
- 30 high school students as part of the PICSE Science Camp
- 40 high school teachers as part of PICSE Teacher Development

Undergraduate students:

I have given demonstrations for the undergraduate students as part of the following events:

- 5 students for AGR3903 Soil and Water Engineering Practice 2, 10 students for AGR3905 Agricultural Engineering Practice, 10 students for ENG4406 Robotics and Machine Vision, 10 students for MEC3905 Mechatronic Practice, 15 students for ENG4902 Professional Practice 1, and one student for ENG4909 Professional Work Experience
- NCEA stall for USQ Career Fair and Orientation Week Market Stall Day

Community groups:

- Two invited presentations for local community groups: Rotary Club of Toowoomba South; Toowoomba Startup Group
- I was one of four panellists at TSBE Dalby Innovation in Agriculture Panel